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(54) Radio receiver

(57) A radio tuner (10) which can convert a conventional tape cassette player into a radio has a size and shape such that it can fit into the tape cassette compartment of such a player and an output magnetic head (22) which provides an audio frequency magnetic flux to be received by the replay head of the cassette player so that the tuner is magnetically coupled to the player. In this way the cassette player can quickly and temporarily be converted to receive radio signals. The tuner (10) can be an AM and/or FM receiver providing mono or stereo output. A variable tuning capacitor (25, Fig. 2) is adjustable by a knurled wheel (24) and the frequency to which the tuner is adjusted is indicated by a dial (26). A LED (28) lights to indicate when

accurate tuning to a radio station has been achieved.

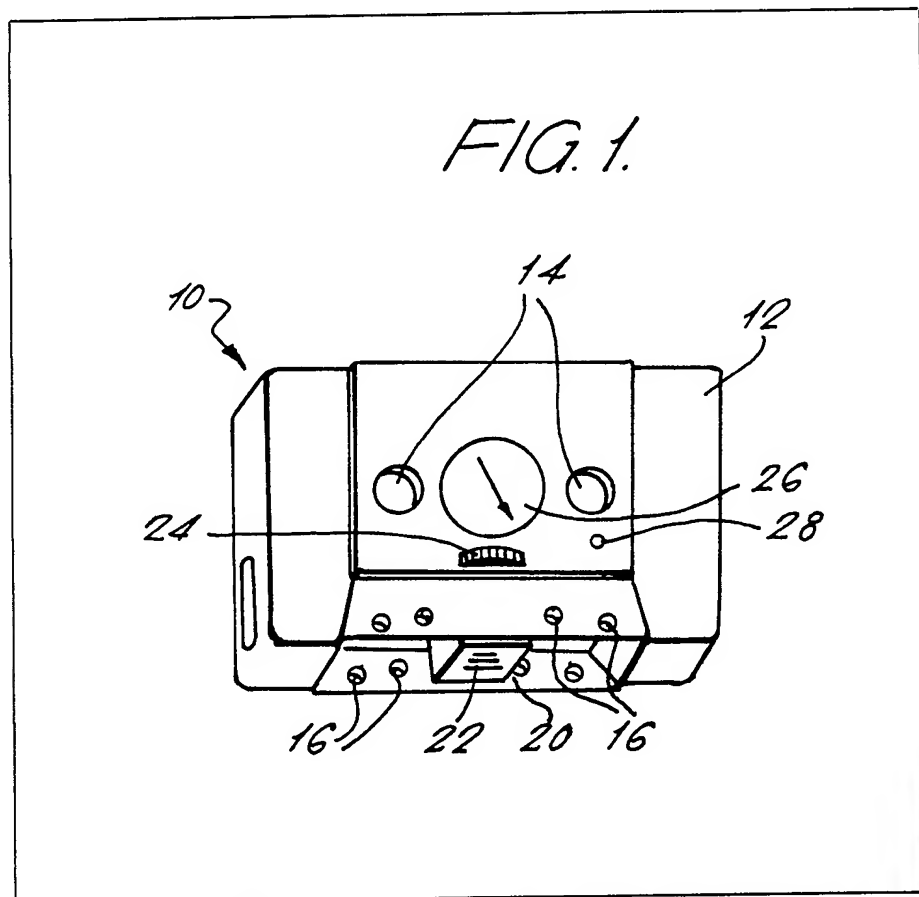


FIG. 1.

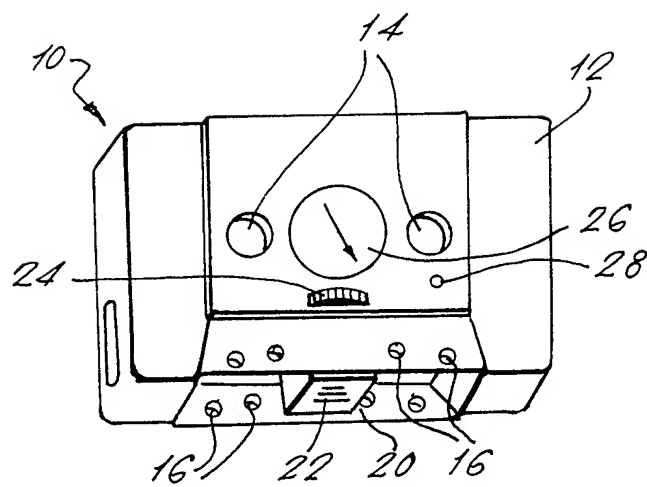
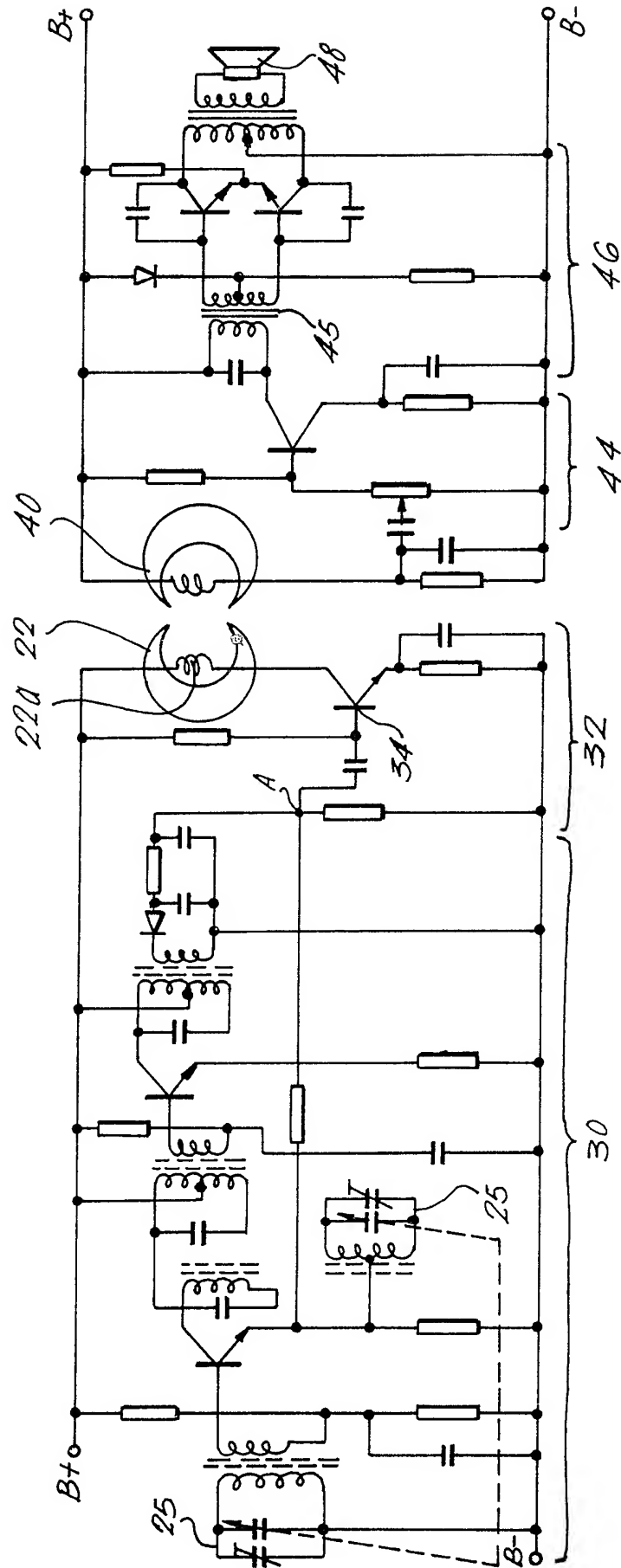


FIG. 2.



## SPECIFICATION

### Radio receivers

- 5 This invention relates to radio receivers and in particular to the tuner portion of such radio receivers.

- In high fidelity equipment, it is known to provide in separate housings the various components of an overall system. Thus, a radio tuner can be provided which will give an audio frequency output to be amplified in a separate amplifier. Equally, a magnetic tape deck can equally be provided whose audio frequency output is fed to the common amplifier.

- Completely self-contained and often portable tape recorders and players are known and the most popular of these do not use open reels of magnetic tape but instead use a tape cassette. Such tape cassettes are widely available in commerce and pre-recorded tape cassettes are available as an alternative to a record. It is believed that the original format, shape and specification of these tape cassettes was set down by "Phillips" but the article is now believed to be sufficiently widely known merely to be referred to hereinafter as a "tape cassette".

- Tape cassette players often are quite compact and portable and can be provided with a tuner so that the user has the choice of either listening to a pre-recorded tape or to the radio. However, this is not possible if the tape cassette player has not been manufactured with this facility. It is therefore an object of the invention to enable the owner of a tape cassette player easily to be able to extend its usage to include the playing of radio programmes.

- According to the invention, there is provided a radio tuner of a shape and size such that it can fit in the playing compartment of a tape cassette player in place of a tape cassette and whose audio frequency output is fed to a magnetic head to provide an audio frequency magnetic flux therefrom, the magnetic head being positioned so that, when the tuner is in the playing compartment of a tape cassette player, the magnetic flux from the magnetic head is received by the replay head of the tape cassette player and so the player can pick up the flux and reproduce the audio frequency magnetic flux output from the tuner.

- Thus, whilst the output from a radio tuner will normally be an electrical signal which is connected to the amplifying circuit and thereafter the loudspeaker, this is not possible with a tape cassette player not having provision for a separate electrical input. Instead, therefore, according to the invention the output from the tuner is magnetically coupled to the amplifying circuit of the tape cassette player and uses the replay head of that player and so no

modification of this player is necessary. Also, because it is possible to design and build very compact radio-receiving circuitry, this can readily be made of a sufficiently small size to be placed in a housing which will fit in the playing compartment. Indeed, it is preferred that the housing for the radio tuner according to the invention have an outside shape and size which is largely the same as that of a conventional tape cassette.

- The tuner of the invention can be an AM and/or FM receiver and equally could provide a mono or stereo output. In the case where the tuner can only produce a mono output signal, the tuner will have a single magnetic head and this should produce a magnetic flux sufficient for the flux to be received by either the single playback head of a mono cassette player or both playback heads in the case where the cassette player is capable of reproducing stereo tape recordings. Conversely, if the tuner can provide a stereo output signal, i.e. two separate decoded signals, the tuner should have two magnetic heads and one separate decoded signal should be fed to one head and one to the other. Then the two heads should be positioned so that in use the flux from each head will be received by its respective playback head in the case of a cassette player equipped to reproduce stereo tape recordings or so that the single playback head of a mono cassette tape player will receive flux from both of the tuner heads. In general, the magnetic head or heads of the tuner of the invention can be of very similar construction to the recording head or heads of a tape cassette recorder and when the tuner is in use in position in the tape cassette compartment of a tape cassette player, its magnetic head or heads should abut or almost abut the playback head or heads of the tape cassette player.

- Although we are not yet certain of this, we believe that the magnetic coupling from the tuner to the cassette player is largely linear and so no special biasing circuitry is necessary in the tuner of the invention, but simply an amplified audio signal is taken from conventional radio signal receiving circuitry and used to drive a magnetic head.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

- Figure 1 is a perspective view of a tuner according to the invention; and

Figure 2 is a circuit diagram of the tuner according to the invention together with the circuitry of an associated tape cassette player.

- A radio tuner 10 according to the invention is shown in Fig. 1. The tuner has a housing 12 which, as can be seen, is of identical overall shape to the shape of a tape cassette. The housing 12 has two circular holes 14 in a position corresponding to the reel driving bosses in the playback compartment of a tape

cassette player although these holes 14 are of a sufficient diameter to accept these bosses and the bosses will have no driving function with respect to the tuner 10. The housing 12

5 also has other holes 16 to accept the drive capstan and positioning pegs in the playback compartment.

At the front of the housing 12 is an open recess 20. In a conventional tape cassette, the

10 strip of magnetic tape would extend across this recess so that it could contact the playback and possibly also a record head of the cassette player. In the tuner 10, this recess 20 accommodates a magnetic head 22.

15 The tuner 10 has a knurled tuning wheel 24 which adjusts variable tuning capacitors 25 shown in Fig. 2 in conventional fashion and in addition moves a tuning dial 26 to show the frequency to which the tuner is

20 adjusted. Finally, a light emitting diode 28 is provided which will be light in conventional fashion when accurate tuning to a radio station has been achieved.

The housing 12 contains an electrical tuner circuit which is shown in the circuit diagram of Fig. 2. Power for this circuit is provided by batteries, not shown, which are carried in the housing and are accessible through a removable cover not visible in Fig. 1.

30 Turning to the circuit shown in Fig. 2, this includes a conventional radio tuning circuit 30 the output from which is an audio frequency signal at the point A. It will be seen that the circuit 30 includes the variable tuning capacitors 25. The construction and operation of this circuit is entirely conventional and will not

35 be further described. The audio frequency signal is next passed to an amplifier circuit 32 which includes a transistor 34 and, as the load on the transistor, the magnetic head 22. Therefore, the amplified audio signal is passed to the head where it is converted to a corresponding varying magnetic flux. Of course, if the load on the transistor has been a loudspeaker, then the overall tuner circuit described would have been entirely conventional.

The magnetic head 22 can be of similar construction to the recording head of a magnetic tape recorder comprising an electrical

50 coil 22a wound around a laminated core of magnetic material. The remaining circuitry shown in Fig. 2 on the right-hand side of the head 22 is the conventional amplifying circuitry of a tape cassette player. This circuitry includes a magnetic playback head 40 and the electrical signal generated in it upon receipt of a magnetic flux from the head 22, or in a conventional case from the magnetic tape, is fed via a capacitor 42 to an amplifying circuit 44 and in turn the amplified signal is passed via a transformer 45 to a push-pull driving circuit 46 to power a loudspeaker 48.

65 In this way, the varying magnetic flux from

the head 22 is received by the head 40 and converted to an electrical signal which in turn gives a sound output from the speaker 48.

Thus, no actual change is required in the circuitry, construction or operation of the cassette player to enable it to function, together with the tuner 10, as a radio receiver.

## CLAIMS

75 1. A radio tuner of a shape and size such that it can fit in the playing compartment of a tape cassette player in place of a tape cassette and whose audio frequency output is fed to a magnetic head to provide an audio frequency

80 magnetic flux therefrom, the magnetic head being positioned so that, when the tuner is in the playing compartment of a tape cassette player, the magnetic flux from the magnetic head is received by the replay head of the

85 tape cassette player and so the player can pick up the flux and reproduce the audio frequency magnetic flux output from the tuner. 2. A radio tuner as claimed in Claim 1 in

90 whose housing has an outside shape and size which is largely the same as that of a conventional tape cassette. 3. A radio tuner as claimed in Claim 1 or Claim 2 which is a mono receiver and has a

95 single magnetic head or gap positioned to produce a magnetic flux output to be received by either the single playback head or gap of a mono cassette player or both playback heads in the case where the cassette player is

100 capable of reproducing stereo tape recordings. 4. A radio tuner as claimed in Claim 1 or Claim 2 which is a stereo receiver and has two magnetic heads or gaps positioned to produce separate magnetic flux outputs to be

105 received either by the two playback heads or gaps of cassette player capable of reproducing stereo tape recording or the single playback head or gap of a mono cassette player. 5. A radio tuner as claimed in any preceding

110 claim in which the output magnetic head when the tuner is in position in the tape cassette compartment of a tape cassette player abuts the playback head or heads of the tape cassette player. 6. A radio tuner as claimed in any preceding

115 claim in which an amplified audio signal from the radio signal receiving circuitry of the tuner is used to drive the output magnetic head. 7. A radio tuner substantially as herein described with reference to the accompanying